MECHANICS AT THE BRITISH ASSOCIATION.

SECTION G had a good meeting at Edinburgh this year, there being a great improvement on last year's gathering at Cardiff. On the members assembling on Thursday morning the fourth inst. in the old University Buildings the first business was naturally the Presidential address. Prof. W. C. Unwin, F.R.S., who this year occupied the chair, is eminently fitted to preside over the Mechanical Science Section. His knowledge of the scientific side of mechanics is well known, and his past experience in the region of practical mechanics puts him thoroughly in touch with the many engineers who frequent the section. His address, which we have already printed, was listened to by a large audience, the theatre being quite full. The vote of thanks to the President for his address was moved by Lord Kelvin and seconded by Mr. Deacon, of Liverpool.

The first paper on the list was a contribution from Mr. James Dredge and Mr. Robert S. McCormick on the American Exhibition, which is to be held next year in Chicago. The paper gave a good general description of the coming show from the engineer's point of view; but the subject is one that offers better scope for the members of Section F. It is manifestly impossible to give anything like a good engineering description within the limits of a short paper, whilst the advantages and disadvantages of exhibiting might well have supplied a theme for discussion in the Economic Section. In fact, the discussion which followed the reading of the paper turned wholly on this branch of the subject. The next three papers were of a sanitary nature. Prof. George Forbes and Mr. G. Watson, of Leeds, both dealt in the disposal of town refuse, the former bringing in the electrical lighting of Edinburgh as a part of his scheme. Mr. Forbes points out that in the electric lighting of towns the demand for power is but for a few hours daily. With no system of accumulators, or power storage, this necessitates a large plant compared to that which would suffice if the demand could be made continuous. The author, therefore, proposes to use Arthur's Seat as an accumulator, by forming a reservoir on its summit, and into this reservoir water would be pumped continuously. The head of water thus obtained would be used for working turbines, which would be of sufficient power for the maximum demand. There would thus be a gain through keeping the steam engines constantly at work, smaller engines could be used, and there would not be the loss incidental to raising steam or keeping the boiler fires banked. The great feature of the scheme, however, is to use the dust-bin refuse of the city as fuel for raising steam. The author would erect destructors, and the waste heat from these would be passed through the boiler flues. Prof. Forbes quoted figures in support of his contention that the scheme is practicable, and he instanced what has been done at Southampton, and elsewhere, in the matter of using domestic refuse for steam-generating purposes. We are not able to criticise the details put forward, but we may venture to say that, if the scheme can be worked out practically, engineers will have put before them an example of the use of waste material which many have not hitherto considered capable of being so successfully applied. The author stated that the refuse of a city, if properly burnt, would generally supply sufficient heat to raise the steam necessary for the electric lighting required. That is a very satisfactory adjustment of supply and demand, and if Prof. Forbes can show municipal engineers how to put it in practice he will have rendered a most important service for which every one should be devoutly grateful. After disposing of the particular scheme for the refuse destruction and electric lighting of Edinburgh, the author gave some interesting particulars of that which has already been done in this country in the matter of burning town refuse.

The next paper was contributed by Mr. G. Watson, of Leeds, and was an excellent treatise on the refuse-destructor question. The various types of apparatus which have already been put in use were illustrated by wall-diagrams, and the chief points in their construction were explained. Mr. Watson is of opinion, and he supported his opinion by results of actual experience, not only that dust-bin refuse can be burned in a properly constructed destructor without nuisance, but that the waste heat can be used for raising steam; or, if required, that dust-bin refuse and sewage sludge, containing 90 per cent. of moisture, may be satisfactorily burnt together, the Horsfall destructor being, apparently, particularly suitable for the purpose. The whole subject is one of great and growing importance. It is to be regretted that both these papers were not printed and distributed previously, so that a thorough criticism of the various points raised might have been made during the discussion.

A paper by Mr. R. F. Grantham, on the absortpion and filteration of sewage was next read. The author gave accounts of many examples that have been carried out in different parts of the world, and of experiments made in this connection. Mr. Grantham is of opinion that the Maplin and Foulness Sands at the mouth of the Thames might be used to advantage for treatment of the sewage of London.

The next paper was of a different character. It was by Mr. G. F. Deacon, and contained a description of the work the author had carried out in shield tunneling in loose ground whilst constructing the Vyrnwy Aqueduct tunnel under the Mersey. The work, as is generally known, was one of remarkable difficulty, and the manner in which the various obstacles to its completion were overcome affords a valuable lesson for engineers.

Mr. D. A. Stevenson next read a paper in which he advocated the construction of a ship canal between the Forth and the Clyde. The scheme included a tunnel high enough to pass the masts of big vessels, and locks sufficiently large to take in ocean-going steamers. The estimated cost is £8,000,000. After a short discussion of this paper the section adjourned.

On the next day, Friday, the 5th inst., the first business was the reading of a paper by Mr. D. Cunningham, in which he described a mechanical system for the distribution of parcels. The device was illustrated by means of a working model, without the aid of which, or drawings of the mechanism, it would be difficult to make the principle understood.

Mr. Alexander Siemens next described two electric locomotives which his firm had recently supplied to the City and South London Railway. These, as it is proper they should, have been more successful in their working than the engines originally placed on the line. The armatures of the motors are wound on the axles, so that no gearing is required. According to diagrams displayed, the efficiency varied between about 90 and 94 per cent. Each locomotive, fully equipped, weighs 13½ tons, and the weight of the train of carriages is about 21 tons, without passengers. The weight, we believe, is considerably greater than in the original locomotives used on the line, and this is undoubtedly an advantage. Mr. J. H. Greathead, Professors Silvanus Thompson, and G. Forbes took part in the discussion; in replying to which the author attributed the success of the motors to large armatures and large field magnets. Prof. Silvanus Thompson stated that Messrs. Mather and Platt, of Manchester, are now building an electric locomotive which is to be more powerful than anything that has gone before.

Hydraulics next occupied the attention of the section, Messrs. F. Purdon and H. E. Walters describing an interesting tide-motor which they have devised and constructed. The machine takes the form of a floating barge or flat, which is moored athwart the tide-way. There are two drums placed some distance apart, and on these drums a chain is made to travel by floats attached to it, which floats project downwards into the water, and are carried along on the forward stroke by the action of the tide, whilst the return stroke is made in the air. As the flat is moored athwart the stream—in order to utilize the greatest possible area of the current—and as the chain travels fore and aft, guides are used to conduct the water in the proper direction to actuate the floats or paddles. The guides also concentrate the stream. These are roughly the fundamental features of the design, further details of which we are unable to give through limits of space. The machine, however, is very interesting, and is perhaps one of the most promising and best worked-out motors of its kind. There appears now to be better prospect for inventions of this nature than heretofore, on account of the facilities offered for transport of power by means of electricity. It is always a tempting problem to try to use some of the vast store of energy running to waste in the tides, although the question is one beset with practical difficulties that have been sufficient hitherto to make tide-motors very scarce.

A paper by Mr. Pearsall, in which he described a new arrangement of hydraulic ram, which he had made, was next read; Prof. Blyth described a new form of windmill on the principle of the Robinson cup anemometer; and Mr. G. R. Redgrove having read a contribution on Levavasseur's flexible metallic tubing, the second day's proceedings were brought to a close.

The next sitting was held on the following Monday, the section not meeting on Saturday. The arrangement was decidedly a pleasant innovation, the Saturday morning's meeting being by no means popular. Whether there be few or many papers, it seems impossible to get through a sitting in a short time, as there are always one or two speakers, at any rate, who will spin the discussions out, so that those who are obliged to stay to the end have no time to get lunch before starting on the excursions. Section G made a trip to Glasgow on the Saturday, and were rewarded by perhaps the finest exhibition of marine machinery ever collected in a single installation. This comprised the propelling engines of one of the pair of enormous vessels the Fairfield Company are building for the Cunard line. The engines were erected in the shop, and one was enabled to get a fair prospective of their grand proportions, such as will be impossible when they are confined to their natural position on shipboard.

On the section again assembling on the Monday following the first business was the reading of the report of the committee appointed to consider "The Development of Graphic Methods in Mechanical Science." This report had been prepared by Prof. Hele-Shaw, of Liverpool, who must have spent a vast amount of pains in compiling the very bulky document, which was read in abstract. The bibliography should be especially valuable. This is the second report that has been presented by the committee, and, we believe, the subject is to be further investigated. The use of graphic methods is far less common with engineers than it might be with advantage, and the matter is one which the Mechanical Section of the British Association is especially fitted to deal.

Mr. Preece next read two papers, in the first of which he took the municipal authorities to task for causing stack pipes to be disconnected from the drains, and thus depriving these natural lightning conductors of their lead to earth. If Mr. Preece's prognostications are fulfilled there will be a great increase in casualties from lightning when the new legislation comes widely into effect, unless some other means be taken to make connection between stack pipes and earth. Mr. Preece did not read his second paper, but contented himself with saying a few words to signify its scope. Its title was "The use of secondary batteries in telegraphy." For the past seven years secondary batteries have been used at the Post Office to supply current to two large groups of circuits, one group consisting of 110 single needles, and the other of 100 Morse inkers and sounders.

Mr. Gisbert Kapp next read a practical and interesting paper on "Power Transmission by Alternating Current," describing an installation which has been carried out at Cassel. In that town the water supply is a municipal undertaking, the source being at a distance of four miles or so from the town. In the summer a large quantity of water is used, and for this reason a certain amount of pumping has to be done. The pumps are worked by turbines. In the winter the existing natural gravitation supply is sufficient, and the turbine pumps are, therefore, not required. It is, of course, in winter that the chief demand for light occurs and then the turbines, in place of being idle, are used for driving dynamos. Mr. Kapp explained by means of diagrams the manner in which a storage system is carried out so that the turbines may be kept constantly at work. The power is transmitted by a single phase alternating current from the generating station to two sub-stations at Cassel. At one of the sub-stations there is a battery which is charged during the hours of light load, to be in turn drawn upon during the time of heavy load. Each of the two sub-stations contains a transformer so that the distribution is by continuous current, whilst between the generating station and the sub-stations the current is alternating, the pressure being 2000 volts. The installation was the work of Mr. Oskar von Millar, Mr. Kapp designing the alternators. The author gave a good many details of the arrangement of which the above is an outline. In the discussion which followed an interesting point was raised as to the effect of putting the alternators out of step. The author said that in the present instance he had no hesitation in putting the load on suddenly and no effect followed, but if the load were suddenly taken off, the machine would start howling in a frightful manner until it again got in synchrony. This was alarming at first, but not otherwise hurtful.

Mr. E. H. Woods next read a paper in which he gave particulars of a new design of electric locomotive. The driving wheels are placed horizontally, the necessary grip being, we understood, obtained by springs, which press the pairs of wheels against a central rail. There is an ingenious device for points and crossings which was illustrated by a model. The motor is to be kept running continuously, the grip of the wheels being released when the train is stopped, the power then be absorbed by frictional brakes. The relative value of this device naturally depends on the length of the stoppage. Mr. Kapp and Prof. Forbes both spoke on the question of continuous running motors, neither appearing to look with favour on the device.

Monday is generally devoted wholly to electrical engineering, but on this occasion the papers on the subject were not sufficiently numerous to fill up the sitting. The rest of the day was, therefore, filled up with papers of a miscellaneous nature. The first of these was a contribution by Lieut. W. B. Basset, R.N., who described a very ingenious coin-counting machine which has been recently placed in the Royal Mint. It would be impossible to describe this apparatus without the aid of drawings; but it may be stated that 3,000 coins can be counted in a minute, or one ton in three-quarters of an hour. The coins are made to move along a channel of such a size that only one can pass at a time. They are forced along by means of two driving wheels, actuated by an electric motor. At the lower end of the channel is a wheel with notches in its rim, the notches being of a shape that the coins just fit into them. The wheel is made to turn by the coins as they are forced forward, the action being comparable to that of a rack and pinion, the rack being formed by the procession of coins pushed forward by the driving wheels. The counting wheel must necessarily pass a coin for each notch or tooth it advances, and as a given number of teeth always go to a revolution, an accurate record is obtained. The machine in the Mint is arranged to count pence, half-pence, piastres, half-piastres, and Hong Kong cents. It counts on an average over two million coins a month without error.

Mr. Killingworth Hedges next read a paper on "Anti-Friction Material for Bearings used without Lubrication." This referred chiefly to a bearing composed of finely-powdered carbon mixed with steatite, which the author had found valuable. He referred to the advantages of non-lubricated bearings, such as saving in labour, cost of oil, and cleanliness. In the discussion which followed, Professor Unwin well summed up the question by saying that though there might be a higher co-efficient of friction with a non-lubricated bearing, manufacturers could generally well afford a small additional expenditure of power in order to be free from the defects of oiled bearings.

A paper by Mr. B. H. Thwaite on high-pressure boilers, which does not call for notice here, was the last read on this day.

The last day on which Section G sat was Tuesday, the 9th inst., when the proceedings were opened by a paper by Mr. D. A. Stevenson, entitled "Petroleum Engines for Fog Signalling," being read. The paper, which was read by Mr. C. A. Stevenson in his brother's absence, stated that the maximum number of hours of duration of fog in Scotland was 395 per annum. For sounding the siren various motors are available, which may be actuated by the waves or tides, manual labour, clockwork, steam, hot air, gas, or oil. The author states that the oil engine is the best for the purpose. He states, however, that all fog signals which appeal to the ear must be of an unreliable nature, and he would prefer some method, such as had been proposed by Mr. C. A. Stevenson, in which an electric conductor is laid down off a coast, so as to act on an instrument attached to each vessel. It would have added to the value of the paper had sufficient detail of this device been given to afford the meeting an idea of its general principle. As the description stands we quite fail to see how a useful result could be brought about. An interesting discussion followed the reading of this paper, in which the chief feature was the speech of Mr. A. R. Sennett, who pointed out that water is a better medium than air for conveying sound, and reminded the meeting that sound was very liable to be deflected by "acoustic clouds." Tyndall found that the presence of such clouds reduced by one-third the distance at which a given sound could be otherwise heard. Mr. David Cunningham, the harbour engineer at Dundee, gave a remarkable example of the influence of acoustic clouds. He had gone out in a steam yacht when the siren was in operation. At a distance from it of half a mile the, sound was not to be heard, but when they had steamed four miles the siren was again audible. It had been sounding the whole time. To return to Mr. Sennett's remarks, that speaker said he proposed taking advantage of the sound-carrying power of water in the following way. He would have the siren, which indicated a danger, submerged in place of being in the air. It would be arranged to give off a certain note. In each ship there would be a chamber to which the sea would have access, and in this would be a diaphragm which would be tuned to the same note as that emitted by the siren. By the well-known law the diaphragm would not resound unless the note to which it might be attuned were in harmony with that given off by the siren, and therefore false alarms would not be given by the sounds produced by paddle wheels or in other ways. An officer would be placed in a padded cabin, so as to isolate him from the noises of the ship, and by means of an ordinary speaking-tube he would be able to hear the vibrations of the diaphragm, which, as stated, would only take place when they synchronised with the sound-waves produced by the siren. Mr. Sennett's proposal is ingenious, and may contain the germ of a principle of great value. We understood him to say that he had made some experiments in this direction, and that these had been encouraging. It is obvious, however, that investigations of this nature must be somewhat costly, and can lead to but little prospect of pecuniary reward. We would suggest that the matter is one that might well be taken up by the Board of Trade or the Trinity House. Perhaps some of those big shipowners who do their own insurance might be induced to give assistance in this direction. It is quite possible, and indeed probable, that we have been entirely on the wrong tack in sending sound-signals through the air. The experience of Prof. Hughes, quoted by Mr. Sennett, when he found the sound of two stones being knocked together under water could be heard for a distance of half a mile, and heard so distinctly that the Professor did not wish to repeat the experiment, bears on this point. An ordinary bell has been struck under water, and the sound conveyed a distance of nine miles.

Mr. C. A. Stevenson next read a paper of his own "On the Progress of the Dioptric Lens as used in Lighthouse Illumination." This paper was largely historical, going back to the early days of the century, when Alan Stevenson introduced the Fresnel apparatus in Great Britain, and bringing the record up to the year 1886, when the author proposed the spherical lens, an example of which was introduced in one of the Fair Isle lighthouses. This introduction of the spherical refractor has made practicable the construction of more powerful apparatus, with less total space occupied. It has also rendered practicable a quadrilateral arrangement with hyper-radiant lenses. This arrangement has been installed at Fair Isle, the lenses being cut so as to give two flashes from each side of the quadrilateral. An experimental example for Ireland is 2 m. focal distance, and the spherical refractor is 7′ 6″ in diameter, and will give one flash from each side of the quadrilateral.

Mr. A. R. Sennett next read a paper which was both interesting and of practical importance. Its theme was the much ill-treated smoke-prevention question, and we may at once say it was refreshing to find this important but ever-abused problem approached in an intelligent manner. Mr. Sennett has evolved a very simple device which, it might perhaps be rash to say, has exorcised the smoke fiend in regard to boiler furnaces; but if we are to accept his statements—and we see no reason why we should not—there is no longer excuse for steam users allowing smoke to emerge from boiler chimneys. We all know it is not difficult to prevent smoke if fuel economy be left out of the question, but Mr. Sennett tells us he not only prevents smoke, but saves coal. The latter part of the claim is vouched for by Professor Alexander Kennedy, who is perhaps our best authority on this subject; and, with regard to the smoke prevention, Section G was able to judge for itself, as the author had a fair-sized return-tube boiler at work in a yard close to the meeting-room. The paper was of considerable length, but was listened to with interest throughout. By means of wall diagrams, devices of various classes, previously introduced, were illustrated and described. These played much the same part as the awful example at a teetotal lecture, only serving to emphasize the virtues of the author's own invention. Some of them, it must be confessed, were sufficiently absurd; one especially, in which the products of combustion were cleansed from soot by a sand filter, afforded the meeting a good deal of amusement. We imagine the impression of the average engineer to be that the drier and hotter the air fed to a furnace the quicker and more perfect would be the combustion. This Mr. Sennett shows to be not exactly the fact, or, at any rate, that the presence of steam with the air promotes combustion. He says that hydrogen, steam, or aqueous vapour, in the furnace is necessary. He combats the view, "too readily assumed," that the presence of an excess of oxygen contained in dry air will of necessity effect complete combustion. The advantage of supplying air above the grate bars, as well as below, is, of course, well understood, and it is with the volume of air introduced above that the author chiefly deals. His device consists chiefly of an air injector, the steam for inducing the air-current being super-heated in a coil placed in the chimney. The apparatus is termed a transformer, because it transforms the kinetic energy of a small current of steam at high pressure into that of a large current of air at low pressure: a description which conveys the whole scheme of the invention, although the working out of the details requires some attention. With the transformer Mr. Sennett has carried out some experiments. He worked it firstly by steam, and secondly by compressed air, and he found that the volume of air required for combustion was very much less in the former case than in the latter. In explanation, or rather in illustration, of this fact the author quotes several interesting facts. Mr. H. Brereton Baker investigated the phenomena which accompany the burning of carbon and phosphorus in oxygen. Finely powdered charcoal was carefully dried and sealed up in a hard glass tube containing oxygen saturated with water. The tubes were placed in a flame, and the carbon burnt with bright scintillating flashes. When the oxygen was dry no combustion took place in the tube, though the latter was heated to bright red; a result which came clearly as a surprise to many of the members of non-chemical Section G. Mr. Baker has said that the results obtained clearly show that the burning of carbon is much retarded by drying the oxygen. With regard to the presence of moisture and the behaviour of carbonic oxide gas in oxygen the effect is even more remarkable. The author quotes Prof. H. B. Dixon, who says: "That if the mixture of the two gases be very carefully dried it is no longer explosive, and a platinum wire may be heated to redness in it without causing explosion; oxidation of the carbon monoxide to dioxide then taking place gradually, and only in the immediate neighbourhood (at the surface) of the glowing wire. A burning jet of carbonic oxide may even be extinguished by plunging it into a jar containing dried oxygen." We will quote one more interesting fact in connection with this subject. Sir Lowthian Bell has noticed that the gases at the throat of blast furnaces, which are of a temperature of about 250 to 300 Cent., are not inflammable in atmospheric air. Any small quantity which escapes does so without undergoing combustion. But the moment a tuyere commences to leak the gas takes fire; just as a small quantity of hydrogen in the eudiometric researches produced explosion in a mixture not previously influenced by the electric spark. The author does not attempt to decide whether the acceleration or retardation of the union of oxygen with the evolved hydro-carbon gases is due to the presence of aqueous vapour or of the hydrogen. Section G may fairly look to Sections A or B for enlightenment upon that point.

We have given so much space to what we think the most interesting part of Mr. Sennett's paper that we may, perhaps, be doing him the injustice of suggesting that other points do not receive attention. This, however, is not the case, for he does not lose sight of the leading canons of furnace practice, such as proper admixture of the gases, adequate space for combustion, keeping the gases from contact with the heating surface (from this point of view the cooling surface) of the boiler, and other matters, of a similar nature. The result of the whole arrangement is that smoke is undoubtedly prevented from issuing from the funnel. In the boiler referred to a very dirty coal was burned, the result being a particularly pungent smoke, which was sometimes carried down among the spectators by an eddying wind. When the transformer was put in operation this smoke entirely disappeared. Upon the apparatus being put out of action the sable cloud was again to be seen rolling forth from the chimney-top. These operations were repeated several times, the fire being constantly supplied with green fuel, so as to keep it in its smokiest condition.

Following Mr. Sennett's paper a contribution on the same subject was read by Colonel E. Dulier. The author of this paper deals with the domestic fire, to which, of course, the greater part of the smoke of civilization is to be attributed, but he does not aim at the prevention of smoke, but simply to its arrestation before its gets into the air. In order to effect this object he proposes to wash the chimney gases with a spray, and thus precipitate all soot. He also claims to arrest the greater part of the sulphurous acid, which is of even greater importance. Every dweller in towns and cities will wish Colonel Dulier well in his enterprise, but there are some very big difficulties in his way. The biggest perhaps is that before the plan can become general legislation must be brought to bear. Unhappily dwellers in towns and cities are so little disinterested that the average householder would prefer to see his next-door neighbour erect a costly apparatus (the first cost for a seventeen-chimney house is said to be about £50) rather than go to the expense himself. The large quantity of water required for a general smoke-washing would be a serious problem, not only of cost but of supply at any price, although it is quite possible this difficulty could be, as it should be, met. The cleaning out of the apparatus would be also a serious matter, for the tarry deposit due to smoke-washing is of a particularly tenaceous nature.

The sewage problem next occupied the attention of the meeting, Mr. Crawford Barlow reading a paper on "The London Sewage Question." Mr. J. Cooper also read a paper on "The Sanitation of Edinburgh." The last paper read at this meeting in this section was contributed by Mr. H. C. Carver. It related to fire extinction on board ship. The author has devised an apparatus by means of which he can turn the effluent gases from the boiler furnaces into the hold of a ship where fire is raging; the gases having been previously washed and cooled. The apparatus has been tried practically, and has been found to answer remarkably well. The ordinary practice is to turn boiler steam into a ship's hold; but the spent gases from the furnace are naturally more effective, as steam condenses, and air is thus drawn in. Nevertheless, steam is better than nothing.

After the usual votes of thanks the business of the section was brought to a close.

ANTHROPOLOGY AT THE BRITISH ASSOCIATION.

AFTER the President's address, on Thursday, August 4, Mr. E. W. Brabrook read a paper on the Organization of Local Anthropological Research. The writer, as the representative of a joint committee of delegates from the Society of Antiquaries, the Folklore Society, and the Anthropological Institute, communicated a plan for an ethnographical survey of the United Kingdom, by which observations should be made simultaneously in selected localities on the ancient remains, the local customs, and the physical characters of the people. The matter is one that will not brook undue delay, as the evidence is fast slipping out of our grasp.

The Rev. Frederick Smith read a paper on the Discovery of the Common Occurrence of Palæolithic Weapons in Scotland. The author has made patient and long-continued search in modern and ancient gravel beds of existing rivers, in "Kame" deposits, and finally in certain phases of boulder clay; and he finds abundant evidence in the shape of glaciated, broken, and crushed specimens of the weapons of palæolithic man. He has collected at least 350 specimens, which he believes to be definite evidence of the long-continued sojourn of palæolithic man north of the Border.

A paper on Cyclopean Architecture in the South Pacific Islands was read; also the Reports of the Anthropometric Laboratory Committee, and of the Anthropological Notes and Queries Committee.

In the afternoon the following papers were read:—Dr. L. Manouvrier, On a Fronto-Limbic Formation of the Human Cerebrum; Prof. G. Hartwell Jones, The Indo-Europeans' Conception of a Future Life and its Bearing upon their Religions.

On Friday, Mr. J. Graham Kerr exhibited a collection of weapons, articles of clothing, and a fire drill, used by the Toba Indians of the "Gran Chaco." He accompanied the exhibition with a few explanatory remarks. The specimens had been obtained from a tribe of the Tobas on the banks of the Rio Pilcomayo. Amongst weapons the chief were bows and arrows, the former being noteworthy from their reinforcement by a back string. The arrows were of cane, with long wooden points made of cascarandá. An arrow with an iron head was also shown, the head being formed of fencing wire beaten out.

Mr. J. Montgomerie Bell exhibited a collection of flints from the North Downs of Kent, which he called "pre-palæolithic." The peculiarities of these flints is that they are not shaped into particular forms by the will and skill of the workman, as palæolithic flints are, but they are simply stones taken from the ground and used almost in the state in which they are picked up; only the edges are altered; they are chipped flints rather than shaped flints; used tools, not made tools. Mr. Bell explained the reasons which had convinced him of their authenticity; namely, that the chipping is regular and purpose-like, such as Nature is not likely to have hit upon; it is sometimes within a hollow curve, where natural agencies could not act; the edges of many unbulbed flints have far more regular marks of wear, which is the true indication of use by man, than many bulbed flakes possess, whose edges have undoubtedly been used; and lastly, there is a sequence in the types which leads into the types of the river-valley period.

Mr. J. Theodore Bent read a paper on the Present Inhabitants of Mashonaland and their Origin. The inhabitants of this country are an oppressed and impoverished race of Kaffirs, who dwell amongst the rocks and crannies of the mountains. Their recognized name—Makalanga—means "the children of the sun," and there were traces of a higher civilization amongst them. Their origin is obscure, but references to them by early Arabian writers prove beyond doubt that a similar people inhabited the country one thousand years ago. Each tribe has its totem. Their religion has a monotheistic tendency, but they sacrifice to ancestors, and sacrifice goats to ward off calamities. Their manners are courteous and refined, and their skill in music is considerable.

Prof. A. C. Haddon contributed a paper on the Value of Art in Ethnology. In order to study such an intricate subject as Decorative Art from the point of view of the Biologist it is necessary first to confine one's attention to savage art where the problems are presented in a simpler form. In taking a definite area into consideration, such as British New Guinea, one finds that there are several distinct and well-defined artistic provinces. The Torres Strait district was characterized by the prevalence of straight and angled lines to the exclusion of curved lines and the representation of animal forms, the latter being associated with totemism. In the Gulf District the human face and form is the basis of almost all their art. In the Port Moresby District decoration is in the form of panels and mainly straight and angled lines; whereas in the South Cape and Archipelago District there is a wonderful richness of design in which curved lines are abundant.

It is well known that in this latter district there has been a great mixture of race. It would appear that homogeneous peoples have a uniform style in their art, but that race mixture tends to varied artistic treatment.

Dr. J. S. Phené read a paper on the Similarity of Certain Ancient Necropoleis in the Pyrenees and in North Britain. At Luchon, a spot where the traditions of the Pyrenees were most concentrated, remarkable customs had till recently been practised. The locality abounded with interments of a peculiar kind, more or less surrounding a central mound, serpentine in form, the head of which had been cut away and a small church erected in the cavity. The walls of this antique little church are covered with votive tablets of early Christian and pagan Roman times. Almost all the features shown had been discovered by the author in Somersetshire, Bedfordshire, Argyleshire, and Peebleshire.

The following papers were read:—A Contribution to the Ethnography of Jersey, by Dr. Andrew Dunlop. Notes on the Past and Present Condition of the Natives of the Friendly Islands, or Tonga, by Mr. R. B. Leefe. Damma Island and its Natives, by Dr. F. Bassett Smith. The Reports of the Mashonaland Committee, and of the Canadian Committee were also read.

In the afternoon a discussion on Anthropometric Identification was opened by Dr. Manouvrier, who described the system of measurements introduced by M. A. Bertillon into the French Criminal Department, and showed the manner in which they were made. He said that by its means the identification of criminals was made absolutely certain. Dr. Benedikt of Vienna also bore testimony to the efficiency of M. Bertillon's system and strongly advocated its introduction into Great Britain. Dr. Garson referred to Mr. Galton's method of identification by means of finger marks.

As a result of this discussion the Council have been requested to draw the attention of her Majesty's Government to the subject.

A discussion on the subject of Criminal Anthropology was opened on Saturday by Dr. T. S. Clouston, who reviewed the work done in this and other countries, and pointed out the failure